



State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

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Folder #2

DIVISION OF OIL GAS & MINING FIELD VISIT FORM TECHNICAL

Date : 15 May

Time: 10 am to 3:30 pm

Mine: Co-op Bear Canyon

File Number: ACT/015/025

DOGM Staff: James D. SMITH and Pete HESS

Other Attendees:

For the water users:

Jack STOYANOFF
Daryll LEEMASTER
Lee McELPRANG
Peter J. NIELSEN
Susan LACKEY

North Emery Water Users Assoc.
Castle Valley Special Services District
Cleveland-Huntington Irrigation Co.
SECOR International, Inc.
SECOR International, Inc.

For Bear Canyon Mine:

Charles REYNOLDS
Cyril JACKSON
Ken DEFA
Bryan RUNDELL

Bear Canyon Mine
Bear Canyon Mine
Bear Canyon Mine
Commercial Testing & Engineering Co. (CTE)

Purpose:

North Emery Water Users Association, Castle Valley Special Services District, and Cleveland-Huntington Irrigation Company were given permission by the Board of Oil, Gas and Mining to collect water samples from the Bear Canyon Mine to prepare for the upcoming hearing on the renewal of the Bear Mine permit. SECOR collected water samples for the water users group from three locations within the mine and from the UPDES discharge stream. The samples are to be analyzed for water quality parameters such as oil and grease, anions and cations, nitrate and nitrite, and alkalinity. Additional samples were collected for analyses of isotopes of hydrogen



(both tritium and $\delta^2\text{H}$), oxygen, sulphur, and carbon. Coal grab samples were also taken to obtain sulphur isotope data.

Observations:

Bear Canyon Mine had duplicate water samples collected at each site by CTE. Pete Hess and I represented UDOGM but took no water samples.

SECOR is having water quality analysis done at Quantera laboratories in Arvada, Colorado and CTE is performing the water quality work for the mine's samples. Both groups are using the Tritium Laboratory, University of Miami, Florida, for tritium determination and Geochron Laboratories, Cambridge, Massachusetts for the remaining isotope determinations. Expected turnaround time for the isotope determinations is three to four weeks.


Water samples were collected at the UPDES discharge point; from dripping roof bolt drill holes at the west end of 3rd West (identified as 3rd West South); from a horizontal bore hole at the north face in the 3rd West bleeder; and from a zone of heavy seepage from the roof at the extreme north end of 1st North (known as SBC 9 area). I estimate flow into the mine at this last location was one-quarter to one-half cfs over an area of two to three hundred square feet, the heaviest flow from a sandstone channel where mining stopped due to thinning of the coal beneath the channel. Locations are indicated on the attached map.

Stops were made but no samples collected at a dry sump between Main West and 1st East in 1st North; in 3rd West at crosscut 4 where water was dripping from a large area of roof but nowhere at a rate that would allow sampling in a reasonable time; and at crosscut 65 in 1st North where there was a large pool of water in a sump, despite the sump having been pumped down several feet overnight, and the borehole from which a sample was hoped to be taken was not accessible.

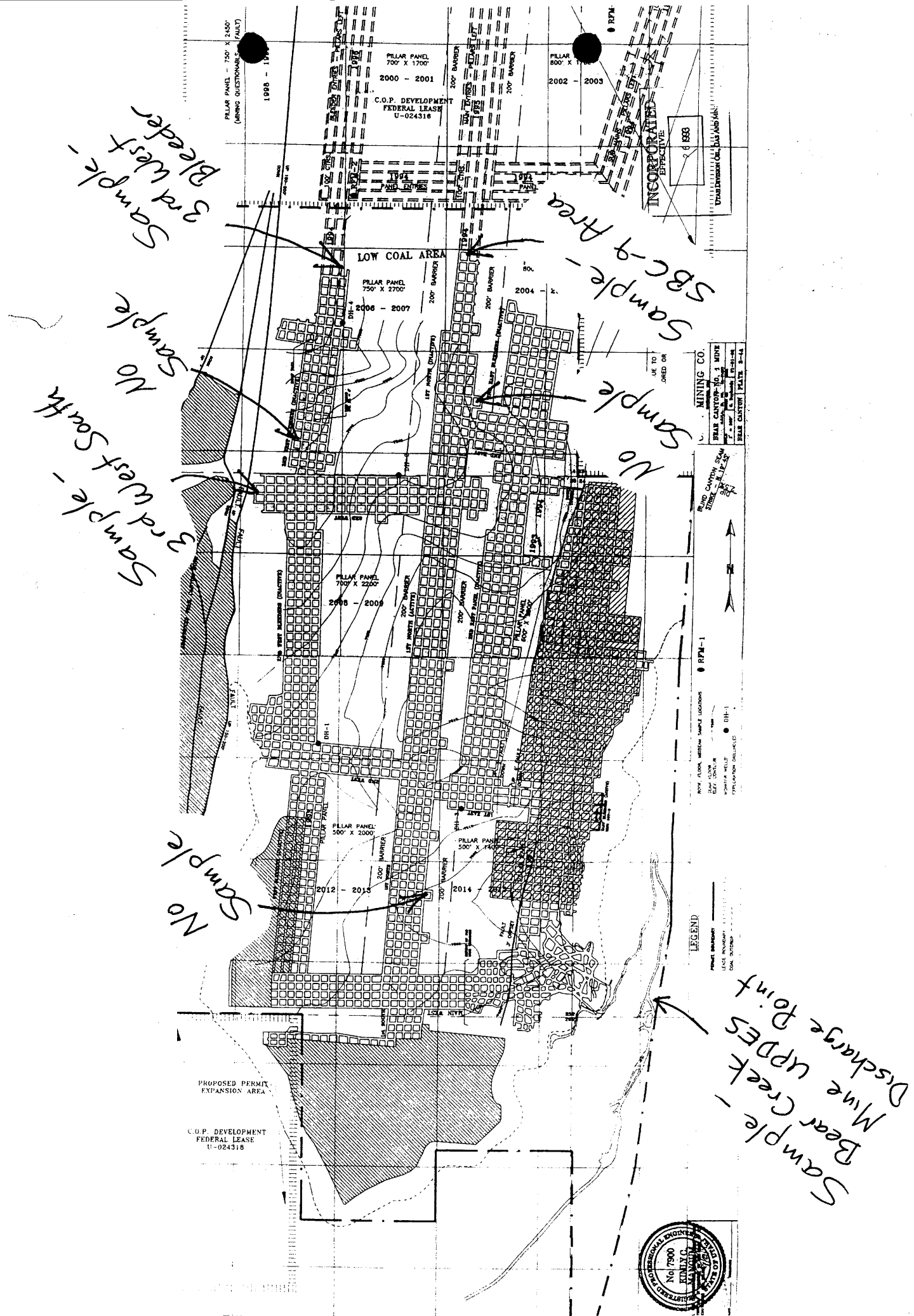
Grab samples of coal were taken by SECOR from the Bear Canyon seam at the 3rd West Bleeder site and from the Tank seam.

Recommendations/Conclusions:

DOGM received copies of analysis results from SECOR and Co-op in early July 1996. Co-op had samples from Birch and Big Bear Springs analyzed for tritium along with one mine water sample, SBC 9. Tritium was not determined for Co-op's other two mine water samples because of sample-size problems. Copies of analysis results are attached.

Signature:  on 12 July '96

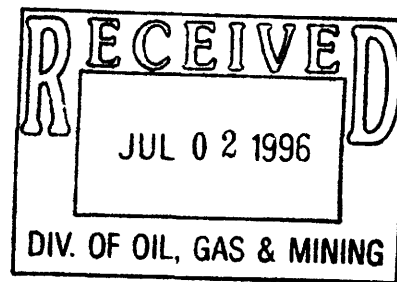
h:\wp\temp\field.wpd



WATER USERS SECTOR

July 1, 1996

James Smith
Reclamation Specialist
Division of Oil, Gas, and Mining
1594 West North Temple, Suite 1210
P.O. Box 145-801
Salt Lake City, UT 84114



Subject: Compound Concentration and Isotopic Results from Groundwater and Mine Discharge Samples collected at the CO-OP Bear Canyon Mine.

Mr. Smith:

SECOR International Incorporated (*SECOR*) has received the analytical and isotopic results from the water samples collected from the Bear Canyon Mine. The samples collected from the mine include:

- ▶ Mine Discharge - Major Cation, Anions, Metals, Oil & Grease, TDS, Alkalinity, tritium, and stable isotopes.
- ▶ 3rd West South - Major Cation, Anions, Metals, Oil & Grease, TDS, Alkalinity, tritium, and stable isotopes.
- ▶ 3rd West Bleeders - Major Cation, Anions, Metals, Oil & Grease, TDS, Alkalinity, tritium, and stable isotopes.

The following Laboratories were used for the compound and isotopic analysis

Laboratory	Analysis
Quanterra Environmental Services 4955 Yarrow Street Arvada, CO 80002 (303) 421-6611	Cations, anions, metals, oil and Grease, and alkalinity
University of Miami Tritium Laboratory 4600 Rickenbacker Causeway Miami, FL 33149-1098 (305) 361-4100	Enriched tritium

GEOCHRON Laboratories
711 Concord Avenue
Cambridge, MA 02134
(617) 876-3691

Oxygen stable isotope ratio analysis (SIRA),
Hydrogen SIRA, carbon SIRA, and sulfur
and sulfide SIRA

During the underground sampling at the Bear Canyon Mine, coal samples were collected from the Bear Canyon and Tank Seams. However, the amount of sulfides in the coal was insufficient for separation and analysis so the coal samples were not delivered to the laboratory for Analysis.

Please call me at (801) 266-7100 if there are any questions concerning the analytical data from the samples collected in the CO-OP Bear Canyon Mine.

Sincerely
SECOR International Incorporated



Peter J. Nielsen, R.G.
Project Hydrogeologist

cc: Darrel Leamaster
Castle Valley Special Services

Attachments

ATTACHMENT 1
GROUNDWATER MAJOR ANALYTICAL RESULTS

Metals

Dissolved Metals

Client Name: SECOR International
Client ID: Mine Dewater
Lab ID: 049076-0003-SA
Matrix: AQUEOUS
Authorized: 17 MAY 96

Sampled: 15 MAY 96
Prepared: See Below

Received: 17 MAY 96
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	ND	mg/L	0.10	6010	NA	21 MAY 96
Calcium	76.2	mg/L	0.20	6010	NA	21 MAY 96
Chromium	ND	mg/L	0.010	6010	NA	21 MAY 96
Iron	ND	mg/L	0.10	6010	NA	21 MAY 96
Lead	ND	mg/L	0.010	7421	NA	22 MAY 96
Magnesium	35.4	mg/L	0.20	6010	NA	21 MAY 96
Manganese	ND	mg/L	0.010	6010	NA	21 MAY 96
Potassium	1.8	mg/L	5.0	6010	NA	21 MAY 96 J
Selenium	ND	mg/L	0.0050	7740	NA	21 MAY 96
Sodium	ND 4.2 "5"	mg/L	5.0	6010	NA	21 MAY 96
Strontium	0.34	mg/L	0.050	6010	NA	21 MAY 96
Zinc	ND	mg/L	0.020	6010	NA	21 MAY 96

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected
NA = Not applicable

Reported By: Kaye Ryman

Approved By: Kristina Sanchez

General Inorganics

Client Name: SECOR International

Client ID: Mine Dewater

Lab ID: 049076-0003-SA

Matrix: AQUEOUS

Authorized: 17 MAY 96

Sampled: 15 MAY 96

Prepared: See Below

Received: 17 MAY 96

Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Total as CaCO ₃ at pH 4.5	294	mg/L	5.0	310.1	NA	21 MAY 96
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	294	mg/L	5.0	310.1	NA	21 MAY 96
Alkalinity, Carb. as CaCO ₃ at pH 8.3	ND	mg/L	5.0	310.1	NA	21 MAY 96
Alkalinity, Hydrox. as CaCO ₃	ND	mg/L	5.0	310.1	NA	21 MAY 96
Chloride	3.5	mg/L	3.0	300.0	NA	27 MAY 96
Fluoride	ND	mg/L	0.50	300.0	NA	27 MAY 96
Nitrate plus Nitrite as N	ND	mg/L	0.10	353.2	NA	22 MAY 96
Sulfate	60.3	mg/L	5.0	300.0	NA	27 MAY 96
Total Dissolved Solids	383	mg/L	10.0	160.1	NA	21 MAY 96

ND = Not detected

NA = Not applicable

Reported By: Mark Freize

Approved By: Janice Collins

Extractable Petroleum Hydrocarbons
Method 8015 Modified

Client Name: SECOR International
Client ID: Mine Dewater
Lab ID: 049097-0002-SA
Matrix: AQUEOUS
Authorized: 18 MAY 96

Sampled: 15 MAY 96
Received: 17 MAY 96

Prepared: 21 MAY 96
Analyzed: 29 MAY 96

Parameter	Result	Units	Reporting Limit
Diesel Range Organics	ND	mg/L	0.095
Surrogate	Recovery		
o-Terphenyl	84	%	

Dilution factor is 0.95. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Bret Collins

Approved By: Linnet Ohanlon

Metals**Dissolved Metals**

Client Name: SECOR International
Client ID: 3rd West South
Lab ID: 049076-0002-SA
Matrix: AQUEOUS
Authorized: 17 MAY 96

Sampled: 15 MAY 96
Prepared: See Below

Received: 17 MAY 96
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	ND	mg/L	0.10	6010	NA	21 MAY 96
Calcium	114	mg/L	0.20	6010	NA	21 MAY 96
Chromium	ND	mg/L	0.010	6010	NA	21 MAY 96
Iron	ND	mg/L	0.10	6010	NA	21 MAY 96
Lead	ND	mg/L	0.010	7421	NA	22 MAY 96
Magnesium	76.1	mg/L	0.20	6010	NA	21 MAY 96
Manganese	ND	mg/L	0.010	6010	NA	21 MAY 96
Potassium	4.0	mg/L	5.0	6010	NA	21 MAY 96 J
Selenium	0.0057	mg/L	0.0050	7740	NA	21 MAY 96
Sodium	16.9	mg/L	5.0	6010	NA	21 MAY 96
Strontium	0.66	mg/L	0.050	6010	NA	21 MAY 96
Zinc	ND	mg/L	0.020	6010	NA	21 MAY 96

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected
NA = Not applicable

Reported By: Kaye Ryman

Approved By: Kristina Sanchez

General Inorganics

Client Name: SECOR International
Client ID: 3rd West South
Lab ID: 049076-0002-SA
Matrix: AQUEOUS
Authorized: 17 MAY 96

Sampled: 15 MAY 96
Prepared: See Below

Received: 17 MAY 96
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Total as CaCO ₃ at pH 4.5	397	mg/L	5.0	310.1	NA	21 MAY 96
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	397	mg/L	5.0	310.1	NA	21 MAY 96
Alkalinity, Carb. as CaCO ₃ at pH 8.3	ND	mg/L	5.0	310.1	NA	21 MAY 96
Alkalinity, Hydrox. as CaCO ₃	ND	mg/L	5.0	310.1	NA	21 MAY 96
Chloride	24.3	mg/L	3.0	300.0	NA	27 MAY 96
Fluoride	0.90	mg/L	0.50	300.0	NA	27 MAY 96
Nitrate plus Nitrite as N	ND	mg/L	0.10	353.2	NA	22 MAY 96
Sulfate	171	mg/L	25.0	300.0	NA	27 MAY 96
Total Dissolved Solids	672	mg/L	10.0	160.1	NA	21 MAY 96

ND = Not detected
NA = Not applicable

Reported By: Mark Freize

Approved By: Janice Collins

Extractable Petroleum Hydrocarbons
Method 8015 Modified

Client Name: SECOR International
Client ID: 3rd West South
Lab ID: 049097-0004-SA
Matrix: AQUEOUS
Authorized: 18 MAY 96

Sampled: 15 MAY 96
Received: 17 MAY 96

Prepared: 21 MAY 96
Analyzed: 29 MAY 96

Parameter	Result	Units	Reporting Limit
Diesel Range Organics	ND	mg/L	0.095
Surrogate	Recovery		
o-Terphenyl	95	%	

Dilution factor is 0.95. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Bret Collins

Approved By: Linnet Ohanlon

Metals

Dissolved Metals

Client Name: SECOR International
Client ID: SBC-9 Source
Lab ID: 049076-0001-SA
Matrix: AQUEOUS
Authorized: 17 MAY 96

Sampled: 15 MAY 96
Prepared: See Below

Received: 17 MAY 96
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	ND	mg/L	0.10	6010	NA	21 MAY 96
Calcium	78.7	mg/L	0.20	6010	NA	21 MAY 96
Chromium	ND	mg/L	0.010	6010	NA	21 MAY 96
Iron	0.13	mg/L	0.10	6010	NA	21 MAY 96
Lead	ND	mg/L	0.0050	7421	NA	22 MAY 96
Magnesium	32.2	mg/L	0.20	6010	NA	21 MAY 96
Manganese	0.012	mg/L	0.010	6010	NA	21 MAY 96
Potassium	1.3	mg/L	5.0	6010	NA	21 MAY 96 J
Selenium	ND	mg/L	0.0050	7740	NA	21 MAY 96
Sodium	ND 4.2 "5"	mg/L	5.0	6010	NA	21 MAY 96
Strontium	0.28	mg/L	0.050	6010	NA	21 MAY 96
Zinc	ND	mg/L	0.020	6010	NA	21 MAY 96

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected
NA = Not applicable

Reported By: Kaye Ryman

Approved By: Kristina Sanchez

General Inorganics

Client Name: SECOR International

Client ID: SBC-9 Source

Lab ID: 049076-0001-SA

Matrix: AQUEOUS

Authorized: 17 MAY 96

Sampled: 15 MAY 96

Prepared: See Below

Received: 17 MAY 96

Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Total as CaCO ₃ at pH 4.5	311	mg/L	5.0	310.1	NA	21 MAY 96
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	311	mg/L	5.0	310.1	NA	21 MAY 96
Alkalinity, Carb. as CaCO ₃ at pH 8.3	ND	mg/L	5.0	310.1	NA	21 MAY 96
Alkalinity, Hydrox. as CaCO ₃	ND	mg/L	5.0	310.1	NA	21 MAY 96
Chloride	3.4	mg/L	3.0	300.0	NA	27 MAY 96
Fluoride	ND	mg/L	0.50	300.0	NA	27 MAY 96
Nitrate plus Nitrite as N	ND	mg/L	0.10	353.2	NA	22 MAY 96
Sulfate	29.9	mg/L	5.0	300.0	NA	27 MAY 96
Total Dissolved Solids	357	mg/L	10.0	160.1	NA	21 MAY 96

ND = Not detected

NA = Not applicable

Reported By: Mark Freize

Approved By: Janice Collins

Extractable Petroleum Hydrocarbons
Method 8015 Modified

Client Name: SECOR International
Client ID: SPC-9 Source
Lab ID: 049097-0001-SA
Matrix: AQUEOUS
Authorized: 18 MAY 96

Sampled: 15 MAY 96
Received: 17 MAY 96

Prepared: 21 MAY 96
Analyzed: 29 MAY 96

Parameter	Result	Units	Reporting Limit
Diesel Range Organics	ND	mg/L	0.096
Surrogate	Recovery		
o-Terphenyl	111	%	

Dilution factor is 0.96. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Bret Collins

Approved By: Linnet Ohanlon

Metals

Dissolved Metals

Client Name: SECOR International

Client ID: 3rd West Bleeder

Lab ID: 049076-0005-SA

Matrix: AQUEOUS

Authorized: 17 MAY 96

Sampled: 15 MAY 96

Prepared: See Below

Received: 17 MAY 96

Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	ND	mg/L	0.10	6010	NA	21 MAY 96
Calcium	74.0	mg/L	0.20	6010	NA	21 MAY 96
Chromium	ND	mg/L	0.010	6010	NA	21 MAY 96
Iron	ND	mg/L	0.10	6010	NA	21 MAY 96
Lead	ND	mg/L	0.0050	7421	NA	22 MAY 96
Magnesium	30.7	mg/L	0.20	6010	NA	21 MAY 96
Manganese	ND	mg/L	0.010	6010	NA	21 MAY 96
Potassium	1.1	mg/L	5.0	6010	NA	21 MAY 96 J
Selenium	ND	mg/L	0.0050	7740	NA	21 MAY 96
Sodium	ND-29 "5"	mg/L	5.0	6010	NA	21 MAY 96
Strontium	0.26	mg/L	0.050	6010	NA	21 MAY 96
Zinc	ND	mg/L	0.020	6010	NA	21 MAY 96

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Kaye Ryman

Approved By: Kristina Sanchez

General Inorganics

Client Name: SECOR International
Client ID: 3rd West Bleeder
Lab ID: 049076-0005-SA
Matrix: AQUEOUS
Authorized: 17 MAY 96

Sampled: 15 MAY 96
Prepared: See Below

Received: 17 MAY 96
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Total as CaCO ₃ at pH 4.5	296	mg/L	5.0	310.1	NA	21 MAY 96
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	296	mg/L	5.0	310.1	NA	21 MAY 96
Alkalinity, Carb. as CaCO ₃ at pH 8.3	ND	mg/L	5.0	310.1	NA	21 MAY 96
Alkalinity, Hydrox. as CaCO ₃	ND	mg/L	5.0	310.1	NA	21 MAY 96
Chloride	3.9	mg/L	3.0	300.0	NA	27 MAY 96
Fluoride	ND	mg/L	0.50	300.0	NA	27 MAY 96
Nitrate plus Nitrite as N	ND	mg/L	0.10	353.2	NA	22 MAY 96
Sulfate	29.6	mg/L	5.0	300.0	NA	27 MAY 96
Total Dissolved Solids	346	mg/L	10.0	160.1	NA	21 MAY 96

ND = Not detected
NA = Not applicable

Reported By: Mark Freize

Approved By: Janice Collins

Extractable Petroleum Hydrocarbons
Method 8015 Modified

Client Name: SECOR International
Client ID: 3rd West Bleeder
Lab ID: 049097-0003-SA
Matrix: AQUEOUS
Authorized: 18 MAY 96

Sampled: 15 MAY 96
Received: 17 MAY 96

Prepared: 21 MAY 96
Analyzed: 29 MAY 96

Parameter	Result	Units	Reporting Limit
Diesel Range Organics	ND	mg/L	0.095
Surrogate	Recovery		
o-Terphenyl	124	%	

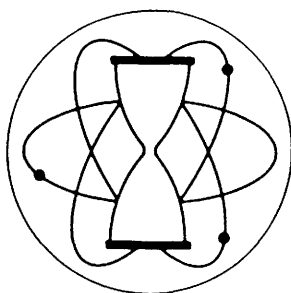
Dilution factor is 0.95. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Bret Collins

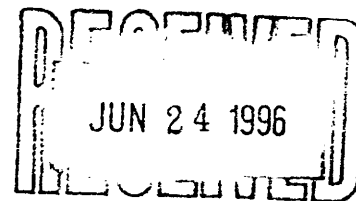
Approved By: Linnet Ohanlon

ATTACHMENT 2
GROUNDWATER STABLE AND RADIOMETRIC ISOTOPE RESULTS



GEOCHRON LABORATORIES a division of
KRUEGER ENTERPRISES, INC.

711 CONCORD AVENUE ♦ CAMBRIDGE, MASSACHUSETTS 02138 ♦ U. S. A
TELEPHONE: (617) 876-3691 TELEFAX: (617) 661-0148



STABLE ISOTOPE RATIO ANALYSES

REPORT OF ANALYTICAL WORK

Submitted by: Peter Nielsen
SECOR
4001 South 700 East
Suite 250
Salt Lake City, UT 84107

Date Received: 05/17/96
Date Reported: 06/19/96
Your Reference: Proj # T0005-001.1
Task # 6.1

Our Lab. Number	Your Sample Number	Description	$\delta^{34}\text{S}^*$
SR-90021	3 rd West South	BaSO ₄	- 0.6
SR-90022	3 rd West Bleeders	BaSO ₄	+10.8 +10.8 **
SR-90023	SBC-9 North Mains	BaSO ₄	+11.4

** Duplicate preparations and analyses.

*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

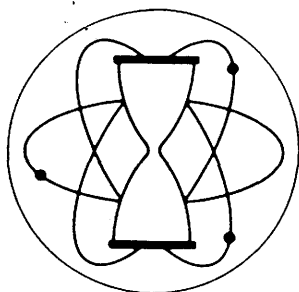
$$\delta^{34}\text{S}_{\text{sample}} \text{‰} = \left[\frac{{}^{34}\text{S}/{}^{32}\text{S}_{\text{sample}}}{{}^{34}\text{S}/{}^{32}\text{S}_{\text{standard}}} - 1 \right] \times 1000$$

Where:

³⁴S/³²S standard is Cañon Diablo troilite

And:

³⁴S/³²S = 0.0450045



GEOCHRON LABORATORIES a division of
KRUEGER ENTERPRISES, INC.

711 CONCORD AVENUE ♦ CAMBRIDGE, MASSACHUSETTS 02138 ♦ U. S. A
TELEPHONE: (617) 876-3691 TELEFAX: (617) 661-0148

STABLE ISOTOPE RATIO ANALYSES

REPORT OF ANALYTICAL WORK

Submitted by: Peter Nielsen
SECOR
4001 South 700 East
Suite 250
Salt Lake City, UT 84107

Date Received: 05/17/96
Date Reported: 05/23/96
Your Reference: Proj # T0005-001.1
Task # 6.1

Our Lab. Number	Your Sample Number	Description	δD^*	$\delta^{18}O^*$
HOR-90018	3 rd West South	Water	-122 -122 **	-16.8
HOR-90019	SBC-9 North Mains	Water	-125	-17.1 -17.2 **
HOR-90020	3 rd West Bleeders	Water	-123	-17.0

** Duplicate preparations and analyses.

*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{\text{sample}} \text{‰} = \left[\frac{R_{\text{sample}}}{R_{\text{standard}}} - 1 \right] \times 1000$$

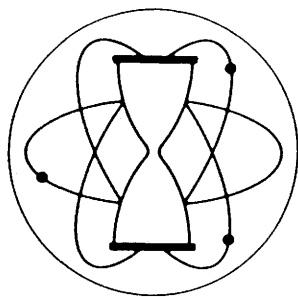
Where:

D/H standard is SMOW
 $^{18}O/^{16}O$ standard is SMOW

And:

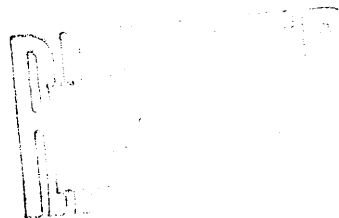
D/H_{standard} = 0.000316**
 $^{18}O/^{16}O_{\text{standard}}$ = 0.0039948**

**Double atom ratio



GEOCHRON LABORATORIES a division of
KRUEGER ENTERPRISES, INC.

711 CONCORD AVENUE ♦ CAMBRIDGE, MASSACHUSETTS 02138 ♦ U. S. A
TELEPHONE: (617) 876-3691 TELEFAX: (617) 661-0148



STABLE ISOTOPE RATIO ANALYSES

REPORT OF ANALYTICAL WORK

Submitted by: Peter Nielsen
SECOR
4001 South 700 East
Suite 250
Salt Lake City, UT 84107

Date Received: 05/17/96
Date Reported: 05/23/96
Your Reference: Proj # T0005-001.1
Task # 6.1

Our Lab. Number	Your Sample Number	Description	$\delta^{13}\text{C}^*$
CR-90021	3 rd West South	BaCO ₃	-12.3
CR-90022	3 rd West Bleeders	BaCO ₃	-12.0
CR-90023	SBC-9 North Mains	BaCO ₃	-12.1

** Duplicate preparations and analyses.

*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

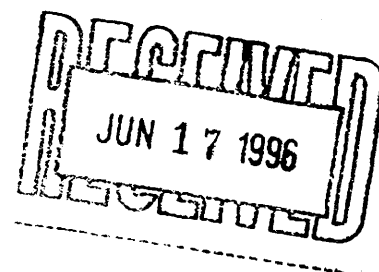
$$\delta^{13}\text{C}_{\text{sample}} \text{‰} = \left[\frac{^{13}\text{C}/^{12}\text{C}_{\text{sample}}}{^{13}\text{C}/^{12}\text{C}_{\text{standard}}} - 1 \right] \times 1000$$

Where:

$^{13}\text{C}/^{12}\text{C}$ standard is PDB

And:

$^{13}\text{C}/^{12}\text{C}$ standard = 0.011237




June 12, 1996

TRITIUM LABORATORY

Data Release #96-53
Job # 846

SECOR INTERNATIONAL, INC.
TRITIUM SAMPLES

Purchase Order # 026-0043


Dr. H. Gote Ostlund
Head, Tritium Laboratory

Distribution:

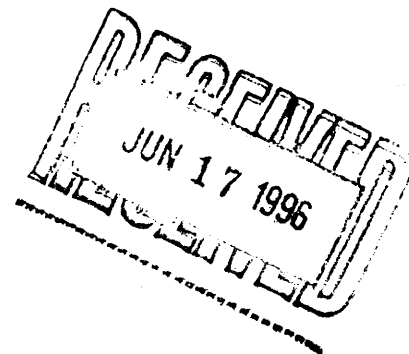
Peter Nielsen
SECOR INTERNATIONAL, INC.
4001 South, 700 East, Ste. 250
Salt Lake City, UT 84107

Rosenstiel School of Marine and Atmospheric Science
Tritium Laboratory
4600 Rickenbacker Causeway
Miami, Florida 33149-1098
(305) 361-4100
Fax (305) 361-4112

Client: SECOR
Recvd : 96/05/17
Job# : 846
Final : 96/06/11

Purchase Order: 0260043
Contact: Peter Nielsen 801/266-7100, fx -7118
4001 South 700 East, Suite 250
Salt Lake City, Utah 84107

Cust	LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
SECOR-	SBC-9 NORTH MAIN	846.01	960515	1000	225	0.40	0.09
SECOR-	3RD WEST SOUTH	846.02	950615	1000	254	-0.05	0.09
SECOR-	3RD WEST BLEEDER	846.03	950615	1000	275	2.22	0.10



CO-OP



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FAX: (801) 653-2436

June 3, 1996

CO-OP MINE
P.O. Box 1245
Huntington UT 84528

Sample identification by
CO-OP MINE

NPDES-004

Kind of sample Water
reported to us

Temperature 10.0°C
Rec'd 1440 hr.
Sampled 1145 hr.

Sample taken at Co-op

Sample taken by CT&E

FIELD MEASUREMENTS

pH 7.55

Conductivity 775

Date sampled May 15, 1996

NOTE: Dissolved metals filtered at Lab.

Date received May 15, 1996

Analysis report no. 59-15975

Parameter	Result	MRL	Units	Method	Analyzed	
					Date/Time	Analyst
Alkalinity, Bicarbonate	351	2	mg/l as HCO ₃	SM2320-B	05-20-1996 0730	SW
Alkalinity, Carbonate	<2	2	mg/l as CO ₃	SM2320-B	05-20-1996 0730	SW
Alkalinity, Total	287	2	mg/l as CaCO ₃	EPA 310.1	05-20-1996 0730	SW
Aluminum, Dissolved	<1	1	mg/l	EPA 202.1	05-22-1996 1045	MK
Anions	7.0	----	meq/l	-----	05-24-1996 1300	BR
Arsenic, Dissolved	<0.004	0.004	mg/l	EPA 206.2	05-17-1996 1230	MK
Boron, Dissolved	0.23	0.03	mg/l	EPA 212.3	05-18-1996 0630	MK
Cadmium, Dissolved	<0.004	0.004	mg/l	EPA 213.1	05-24-1996 0900	MK
Calcium, Total	78	0.2	mg/l	EPA 215.1	05-22-1996 0730	MK
Calcium, Dissolved	77	0.2	mg/l	EPA 215.1	05-22-1996 0730	MK
Cations	7.0	----	meq/l	-----	05-24-1996 1300	BR
Chloride	6.0	0.4	mg/l	SM4500-Cl-B	05-20-1996 1330	SW
Conductivity	626	1	umhos/cm	SM2510-B	05-17-1996 0930	SW
Copper, Dissolved	<0.03	0.03	mg/l	EPA 220.1	05-24-1996 0745	MK
Hardness, Total	342	----	mg/l as CaCO ₃	SM2340-B	05-24-1996 1300	BR
Iron, Total	0.03	0.03	mg/l	EPA 236.1	05-23-1996 1230	MK
Iron, Dissolved	<0.03	0.03	mg/l	EPA 236.1	05-23-1996 1230	MK
Lead, Dissolved	<0.08	0.08	mg/l	EPA 239.1	05-24-1996 0930	MK
Magnesium, Total	36	1.2	mg/l	EPA 242.1	05-22-1996 0830	MK
Magnesium, Dissolved	34	1.2	mg/l	EPA 242.1	05-22-1996 0830	MK
Manganese, Total	<0.04	0.04	mg/l	EPA 243.1	05-23-1996 1300	MK
Manganese, Dissolved	<0.04	0.04	mg/l	EPA 243.1	05-23-1996 1300	MK
Molybdenum, Dissolved	<0.07	0.07	mg/l	EPA 246.1	05-22-1996 1230	MK
Nitrogen, Ammonia	<0.2	0.2	mg/l as N	EPA 350.3	05-22-1996 0730	SW

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Lang Stow for
Huntington Laboratory



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June 3, 1996

CO-OP MINE
P.O. Box 1245
Huntington UT 84528

Sample identification by
CO-OP MINE

NPDES-004

Temperature 10.0°C

Rec'd 1440 hr.

Sampled 1145 hr.

FIELD MEASUREMENTS

pH 7.55

Conductivity 775

NOTE: Dissolved metals filtered at Lab.

Kind of sample Water
reported to us

Sample taken at Co-op

Sample taken by CT&E

Date sampled May 15, 1996

Date received May 15, 1996

Analysis report no. 59-15975

Parameter	Result	MRL	Units	Method	Analyzed		
					Date/Time/Analyst		
Nitrogen, Nitrate-Nitrite	0.07	0.06	mg/l as N	EPA 353.3	05-30-1996 0700	JC	
Nitrogen, Nitrite	0.003	0.002	mg/l as N	EPA 354.1	05-16-1996 1200	JC	
Oil & Grease	<2	2	mg/l	SM5520-B	05-20-1996 0700	JC	
Phosphorous, Ortho-PO ₄	0.005	0.003	mg/l as P	SM4500-P-E	05-16-1996 1000	JC	
Potassium, Total	1.9	0.6	mg/l	EPA 258.1	05-23-1996 1330	MK	
Potassium, Dissolved	1.9	0.6	mg/l	EPA 258.1	05-23-1996 1330	MK	
Selenium, Dissolved	<0.003	0.003	mg/l	EPA 270.2	05-18-1996 0700	MK	
Sodium, Total	5	0.6	mg/l	EPA 273.1	05-23-1996 1400	MK	
Sodium, Dissolved	5	0.6	mg/l	EPA 273.1	05-23-1996 1400	MK	
Solids, Total Dissolved	364	9	mg/l	EPA 160.1	05-16-1996 0700	JC	
Sulfate	51.4	8.0	mg/l	EPA 375.4	05-21-1996 0900	SW	
Zinc, Dissolved	0.01	0.01	mg/l	EPA 289.1	05-24-1996 0800	MK	
Cation/Anion Balance	0.4	----	%		05-24-1996 1300	BR	

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Ray Scott Jr

Huntington Laboratory



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FAX: (801) 653-2436

June 4, 1996

CO-OP MINE
P.O. Box 1245
Huntington UT 84528

Sample identification by
CO-OP MINE

Kind of sample Water
reported to us

Sample taken at Co-op

Sample taken by CT&E

Date sampled May 15, 1996

Date received May 15, 1996

SBC-9 Source

Temperature 10.0°C

Rec'd 1440 hr.

Sampled 1430 hr.

FIELD MEASUREMENTS

pH 7.05

Conductivity 730

NOTE: Dissolved metals filtered at Lab.

Analysis report no. 59-15974

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Alkalinity, Bicarbonate	364	2	mg/l as HCO ₃	SM2320-B	05-20-1996 0730 SW
Alkalinity, Carbonate	<2	2	mg/l as CO ₃	SM2320-B	05-20-1996 0730 SW
Alkalinity, Total	298	2	mg/l as CaCO ₃	EPA 310.1	05-20-1996 0730 SW
Aluminum, Dissolved	<1	1	mg/l	EPA 202.1	05-22-1996 1045 MK
Anions	6.7	----	meq/l	-----	05-24-1996 1300 BR
Arsenic, Dissolved	<0.004	0.004	mg/l	EPA 206.2	05-17-1996 1230 MK
Boron, Dissolved	0.22	0.03	mg/l	EPA 212.3	05-18-1996 0630 MK
Cadmium, Dissolved	<0.004	0.004	mg/l	EPA 213.1	05-24-1996 0900 MK
Calcium, Total	82	0.2	mg/l	EPA 215.1	05-22-1996 0730 MK
Calcium, Dissolved	75	0.2	mg/l	EPA 215.1	05-22-1996 0730 MK
Cations	6.9	----	meq/l	-----	05-24-1996 1300 BR
Chloride	6.0	0.4	mg/l	SM4500-Cl-B	05-20-1996 1330 SW
Conductivity	607	1	umhos/cm	SM2510-B	05-17-1996 0930 SW
Copper, Dissolved	<0.03	0.03	mg/l	EPA 220.1	05-24-1996 0745 MK
Hardness, Total	339	----	mg/l as CaCO ₃	SM2340-B	05-24-1996 1300 BR
Iron, Total	0.16	0.03	mg/l	EPA 236.1	05-23-1996 1230 MK
Iron, Dissolved	<0.03	0.03	mg/l	EPA 236.1	05-23-1996 1230 MK
Lead, Dissolved	<0.08	0.08	mg/l	EPA 239.1	05-24-1996 0930 MK
Magnesium, Total	33	1.2	mg/l	EPA 242.1	05-22-1996 0830 MK
Magnesium, Dissolved	30	1.2	mg/l	EPA 242.1	05-22-1996 0830 MK
Manganese, Total	<0.04	0.04	mg/l	EPA 243.1	05-23-1996 1300 MK
Manganese, Dissolved	<0.04	0.04	mg/l	EPA 243.1	05-23-1996 1300 MK
Molybdenum, Dissolved	<0.07	0.07	mg/l	EPA 246.1	05-22-1996 1230 MK
Nitrogen, Ammonia	<0.2	0.2	mg/l as N	EPA 350.3	05-22-1996 0730 SW

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Ray Scott R

Huntington Laboratory



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FAX: (801) 653-2436

June 4, 1996

CO-OP MINE
P.O. Box 1245
Huntington UT 84528

Sample identification by
CO-OP MINE

SBC-9 Source

Temperature 10.0°C
Rec'd 1440 hr.
Sampled 1430 hr.

Kind of sample Water
reported to us

Sample taken at Co-op

Sample taken by CT&E

Date sampled May 15, 1996

Date received May 15, 1996

FIELD MEASUREMENTS
pH 7.05
Conductivity 730

NOTE: Dissolved metals filtered at Lab.

Analysis report no. 59-15974

Parameter	Result	MRL	Units	Method	Analized Date/Time/Analyst
Nitrogen, Nitrate-Nitrite	<0.06	0.06	mg/l as N	EPA 353.3	05-30-1996 0700 JC
Nitrogen, Nitrite	<0.002	0.002	mg/l as N	EPA 354.1	05-16-1996 1200 JC
Oil & Grease	<2	2	mg/l	SM5520-B	05-20-1996 0700 JC
Phosphorous, Ortho-PO ₄	0.006	0.003	mg/l as P	SM4500-P-E	05-16-1996 1000 JC
Potassium, Total	1.0	0.6	mg/l	EPA 258.1	05-23-1996 1330 MK
Potassium, Dissolved	0.8	0.6	mg/l	EPA 258.1	05-23-1996 1330 MK
Selenium, Dissolved	<0.003	0.003	mg/l	EPA 270.2	05-18-1996 0700 MK
Sodium, Total	4	0.6	mg/l	EPA 273.1	05-23-1996 1400 MK
Sodium, Dissolved	3	0.6	mg/l	EPA 273.1	05-23-1996 1400 MK
Solids, Total Dissolved	341	9	mg/l	EPA 160.1	05-16-1996 0700 JC
Sulfate	29.3	2	mg/l	EPA 375.4	05-21-1996 0900 SW
Zinc, Dissolved	<0.01	0.01	mg/l	EPA 289.1	05-24-1996 0800 MK
Cation/Anion Balance	1.3	----	%		05-24-1996 1300 BR

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Handwritten signature

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FAX: (801) 653-2436

June 3, 1996

CO-OP MINE
P.O. Box 1245
Huntington UT 84528

Sample identification by
CO-OP MINE

3rd West South

Temperature 10.0°C
Rec'd 1440 hr.
Sampled 1200 hr.

FIELD MEASUREMENTS

pH 7.85

Conductivity 1200

NOTE: Dissolved metals filtered at Lab.

Kind of sample Water
reported to us

Sample taken at Co-op

Sample taken by CT&E

Date sampled May 15, 1996

Date received May 15, 1996

Analysis report no. 59-15972

Parameter					Analyzed			
	Result	MRL	Units	Method	Date/Time/Analyst			
Alkalinity, Bicarbonate	438	2	mg/l as HCO ₃	SM2320-B	05-20-1996 0730	SW		
Alkalinity, Carbonate	<2	2	mg/l as CO ₃	SM2320-B	05-20-1996 0730	SW		
Alkalinity, Total	359	2	mg/l as CaCO ₃	EPA 310.1	05-20-1996 0730	SW		
Aluminum, Dissolved	<1	1	mg/l	EPA 202.1	05-22-1996 1045	MK		
Anions	13.0	----	meq/l	-----	05-24-1996 1300	BR		
Arsenic, Dissolved	<0.004	0.004	mg/l	EPA 206.2	05-17-1996 1230	MK		
Boron, Dissolved	0.28	0.03	mg/l	EPA 212.3	05-18-1996 0630	MK		
Cadmium, Dissolved	<0.004	0.004	mg/l	EPA 213.1	05-24-1996 0900	MK		
Calcium, Total	116	0.2	mg/l	EPA 215.1	05-22-1996 0730	MK		
Calcium, Dissolved	113	0.2	mg/l	EPA 215.1	05-22-1996 0730	MK		
Cations	12.8	----	meq/l	-----	05-24-1996 1300	BR		
Chloride	380.0	0.4	mg/l	SM4500-Cl-B	05-20-1996 1330	SW		
Conductivity	1125	1	umhos/cm	SM2510-B	05-17-1996 0930	SW		
Copper, Dissolved	<0.03	0.03	mg/l	EPA 220.1	05-24-1996 0745	MK		
Hardness, Total	606	----	mg/l as CaCO ₃	SM2340-B	05-24-1996 1300	BR		
Iron, Total	<0.03	0.03	mg/l	EPA 236.1	05-23-1996 1230	MK		
Iron, Dissolved	<0.03	0.03	mg/l	EPA 236.1	05-23-1996 1230	MK		
Lead, Dissolved	<0.08	0.08	mg/l	EPA 239.1	05-24-1996 0930	MK		
Magnesium, Total	77	1.2	mg/l	EPA 242.1	05-22-1996 0830	MK		
Magnesium, Dissolved	69	1.2	mg/l	EPA 242.1	05-22-1996 0830	MK		
Manganese, Total	<0.04	0.04	mg/l	EPA 243.1	05-23-1996 1300	MK		
Manganese, Dissolved	<0.04	0.04	mg/l	EPA 243.1	05-23-1996 1300	MK		
Molybdenum, Dissolved	<0.07	0.07	mg/l	EPA 246.1	05-22-1996 1230	MK		
Nitrogen, Ammonia	<0.2	0.2	mg/l as N	EPA 350.3	05-22-1996 0730	SW		

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory



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June 3, 1996

CO-OP MINE
P.O. Box 1245
Huntington UT 84528

Sample identification by
CO-OP MINE

3rd West South

Temperature 10.0°C
Rec'd 1440 hr.
Sampled 1200 hr.

FIELD MEASUREMENTS
pH 7.85
Conductivity 1200

NOTE: Dissolved metals filtered at Lab.

Kind of sample Water
reported to us

Sample taken at Co-op

Sample taken by CT&E

Date sampled May 15, 1996

Date received May 15, 1996

Analysis report no. 59-15972

Parameter	Result	MRL	Units	Method	Analyzed		
					Date/Time/Analyst		
Nitrogen, Nitrate-Nitrite	0.07	0.06	mg/l as N	EPA 353.3	05-30-1996 0700	JC	
Nitrogen, Nitrite	<0.002	0.002	mg/l as N	EPA 354.1	05-16-1996 1200	JC	
Oil & Grease	<2	2	mg/l	SM5520-B	05-20-1996 0700	JC	
Phosphorous, Ortho-PO ₄	0.003	0.003	mg/l as P	SM4500-P-E	05-16-1996 1000	JC	
Potassium, Total	3.0	0.6	mg/l	EPA 258.1	05-23-1996 1330	MK	
Potassium, Dissolved	2.9	0.6	mg/l	EPA 258.1	05-23-1996 1330	MK	
Selenium, Dissolved	0.006	0.003	mg/l	EPA 270.2	05-18-1996 0700	MK	
Sodium, Total	17	0.6	mg/l	EPA 273.1	05-23-1996 1400	MK	
Sodium, Dissolved	12	0.6	mg/l	EPA 273.1	05-23-1996 1400	MK	
Solids, Total Dissolved	748	9	mg/l	EPA 160.1	05-16-1996 0700	JC	
Sulfate	227.0	16.0	mg/l	EPA 375.4	05-21-1996 0900	SW	
Zinc, Dissolved	<0.01	0.01	mg/l	EPA 289.1	05-24-1996 0800	MK	
Cation/Anion Balance	-0.6	----	%		05-24-1996 1300	BR	

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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FAX: (801) 653-2436

June 3, 1996

CO-OP MINE
P.O. Box 1245
Huntington UT 84528

Sample identification by
CO-OP MINE

3rd West Bleeder

Temperature 11.0°C
Rec'd 1440 hr.
Sampled 1340 hr.

Kind of sample Water
reported to us

Sample taken at Co-op

Sample taken by CT&E

Date sampled May 15, 1996

Date received May 15, 1996

FIELD MEASUREMENTS

pH 7.75

Conductivity 730

NOTE: Dissolved metals filtered at Lab.

Analysis report no. 59-15973

Parameter	Result	MRL	Units	Method	Analyzed		
					Date/Time/Analyst		
Alkalinity, Bicarbonate	347	2	mg/l as HCO ₃	SM2320-B	05-20-1996 0730	SW	
Alkalinity, Carbonate	<2	2	mg/l as CO ₃	SM2320-B	05-20-1996 0730	SW	
Alkalinity, Total	285	2	mg/l as CaCO ₃	EPA 310.1	05-20-1996 0730	SW	
Aluminum, Dissolved	<1	1	mg/l	EPA 202.1	05-22-1996 1045	MK	
Anions	6.4	----	meq/l	-----	05-24-1996 1300	BR	
Arsenic, Dissolved	<0.004	0.004	mg/l	EPA 206.2	05-17-1996 1230	MK	
Boron, Dissolved	0.20	0.03	mg/l	EPA 212.3	05-18-1996 0630	MK	
Cadmium, Dissolved	<0.004	0.004	mg/l	EPA 213.1	05-24-1996 0900	MK	
Calcium, Total	77	0.2	mg/l	EPA 215.1	05-22-1996 0730	MK	
Calcium, Dissolved	71	0.2	mg/l	EPA 215.1	05-22-1996 0730	MK	
Cations	6.6	----	meq/l	-----	05-24-1996 1300	BR	
Chloride	6.0	0.4	mg/l	SM4500-Cl-B	05-20-1996 1330	SW	
Conductivity	580	1	umhos/cm	SM2510-B	05-17-1996 0930	SW	
Copper, Dissolved	<0.03	0.03	mg/l	EPA 220.1	05-24-1996 0745	MK	
Hardness, Total	323	----	mg/l as CaCO ₃	SM2340-B	05-24-1996 1300	BR	
Iron, Total	0.12	0.03	mg/l	EPA 236.1	05-23-1996 1230	MK	
Iron, Dissolved	<0.03	0.03	mg/l	EPA 236.1	05-23-1996 1230	MK	
Lead, Dissolved	<0.08	0.08	mg/l	EPA 239.1	05-24-1996 0930	MK	
Magnesium, Total	32	1.2	mg/l	EPA 242.1	05-22-1996 0830	MK	
Magnesium, Dissolved	30	1.2	mg/l	EPA 242.1	05-22-1996 0830	MK	
Manganese, Total	<0.04	0.04	mg/l	EPA 243.1	05-23-1996 1300	MK	
Manganese, Dissolved	<0.04	0.04	mg/l	EPA 243.1	05-23-1996 1300	MK	
Molybdenum, Dissolved	<0.07	0.07	mg/l	EPA 246.1	05-22-1996 1230	MK	
Nitrogen, Ammonia	<0.2	0.2	mg/l as N	EPA 350.3	05-22-1996 0730	SW	

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Brown

Huntington Laboratory



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TEL: (801) 653-2311
FAX: (801) 653-2436

June 3, 1996

CO-OP MINE
P.O. Box 1245
Huntington UT 84528

Sample identification by
CO-OP MINE

3rd West Bleeder

Temperature 11.0°C
Rec'd 1440 hr.
Sampled 1340 hr.

FIELD MEASUREMENTS

pH 7.75

Conductivity 730

NOTE: Dissolved metals filtered at Lab.

Kind of sample Water
reported to us

Sample taken at Co-op

Sample taken by CT&E

Date sampled May 15, 1996

Date received May 15, 1996

Analysis report no. 59-15973

Parameter					Analyzed		
	Result	MRL	Units	Method	Date/Time/Analyst		
Nitrogen, Nitrate-Nitrite	<0.06	0.06	mg/l as N	EPA 353.3	05-30-1996 0700	JC	
Nitrogen, Nitrite	<0.002	0.002	mg/l as N	EPA 354.1	05-16-1996 1200	JC	
Oil & Grease	<2	2	mg/l	SM5520-B	05-20-1996 0700	JC	
Phosphorous, Ortho-PO ₄	<0.003	0.003	mg/l as P	SM4500-P-E	05-16-1996 1000	JC	
Potassium, Total	0.9	0.6	mg/l	EPA 258.1	05-23-1996 1330	MK	
Potassium, Dissolved	0.8	0.6	mg/l	EPA 258.1	05-23-1996 1330	MK	
Selenium, Dissolved	<0.003	0.003	mg/l	EPA 270.2	05-18-1996 0700	MK	
Sodium, Total	4	0.6	mg/l	EPA 273.1	05-23-1996 1400	MK	
Sodium, Dissolved	4	0.6	mg/l	EPA 273.1	05-23-1996 1400	MK	
Solids, Total Dissolved	315	9	mg/l	EPA 160.1	05-16-1996 0700	JC	
Sulfate	26.9	0.8	mg/l	EPA 375.4	05-21-1996 0900	SW	
Zinc, Dissolved	0.04	0.01	mg/l	EPA 289.1	05-24-1996 0800	MK	
Cation/Anion Balance	1.5	----	%		05-24-1996 1300	BR	

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Scott R

Huntington Laboratory



OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS, TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

TERMS AND CONDITIONS ON REVERSE

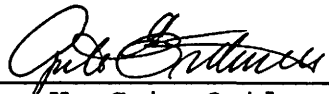


June 12, 1996

TRITIUM LABORATORY

Data Release #96-54
Job # 847

CO-OP MINING COMPANY
TRITIUM SAMPLES


Dr. H. Gote Ostlund
Head, Tritium Laboratory

Distribution:
Co-Op Mining Company
Box 1245
Huntington, Utah 84528

Rosenstiel School of Marine and Atmospheric Science
Tritium Laboratory
4600 Rickenbacker Causeway
Miami, Florida 33149-1098
(305) 361-4100
Fax (305) 361-4112

Client: CO-OP MINING COMPANY
Recvd : 96/05/24
Job# : 847
Final : 96/06/11

Purchase Order: 12264
Contact: Co-Op Mining Co. 801/687-2450
P.O. Box 1245 Fax -5238
Huntington, UT 84528

Cust	LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
CO-OP	BIRCH SPRING	847.01	960520	1000	275 r	0.35	0.10
CO-OP	BIG BEAR SPRING	847.02	960520	950	229	14.2	0.5
CO-OP	SBC-9 SOURCE	847.03	950515	1000	247 r	0.36	0.09

r: RERUN in progress

Client: CO-OP MINING COMPANY

Recvd : 96/05/24

Job# : 847

Final : 96/06/11

Purchase Order: 12264

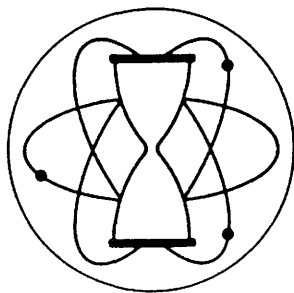
Contact: Co-Op Mining Co. 801/687-2450

P.O. Box 1245 Fax -5238

Huntington, UT 84528

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r: RERUN in progress



GEOCHRON LABORATORIES a division of
KRUEGER ENTERPRISES, INC.

711 CONCORD AVENUE ♦ CAMBRIDGE, MASSACHUSETTS 02138 ♦ U. S. A
TELEPHONE: (617) 876-3691 TELEFAX: (617) 661-0148

STABLE ISOTOPE RATIO ANALYSES

REPORT OF ANALYTICAL WORK

Submitted by: Charles Reynolds
Co-op Mining Company
P.O. Box 1245
Huntington, UT 84528

Date Received: 05/23/96
Date Reported: 06/19/96
Your Reference: P.O. #12265

Our Lab. Number	Your Sample Number	Description	$\delta^{34}\text{S}$
SR-90039	Birch Spring	BaSO ₄	+ 3.8
SR-90040	Big Bear Spring	BaSO ₄	+ 5.4
SR-90041	SBC-9 Source	BaSO ₄	+11.3

*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

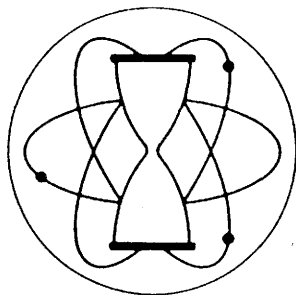
$$\delta^{34}\text{S}_{\text{sample}} \text{‰} = \left[\frac{{}^{34}\text{S}/{}^{32}\text{S}_{\text{sample}}}{{}^{34}\text{S}/{}^{32}\text{S}_{\text{standard}}} - 1 \right] \times 1000$$

Where:

${}^{34}\text{S}/{}^{32}\text{S}$ standard is Cañon Diablo troilite

And:

${}^{34}\text{S}/{}^{32}\text{S} = 0.0450045$



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Huntington, UT 84528

Date Received: 05/23/96
Date Reported: 06/19/96
Your Reference: P.O. #12265

Our Lab. Number	Your Sample Number	Description	$\delta^{13}\text{C}$ *		
CR-90039	Birch Spring	BaCO ₃	-9.7	-10.8	-10.3 **
CR-90040	Big Bear Spring	BaCO ₃		-9.7	
CR-90041	SBC-9 Source	BaCO ₃		-10.0	

** Replicate preparations and analysis.

*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

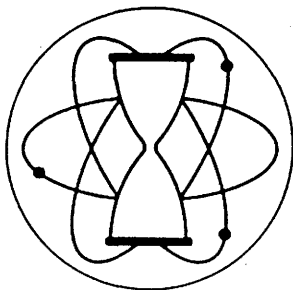
$$\delta^{13}\text{C}_{\text{sample}} \text{‰} = \left[\frac{^{13}\text{C}/^{12}\text{C}_{\text{sample}}}{^{13}\text{C}/^{12}\text{C}_{\text{standard}}} - 1 \right] \times 1000$$

Where:

$^{13}\text{C}/^{12}\text{C}$ standard is PDB

And:

$^{13}\text{C}/^{12}\text{C}$ standard = 0.011237



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STABLE ISOTOPE RATIO ANALYSES

REPORT OF ANALYTICAL WORK

Submitted by: Charles Reynolds
Co-op Mining Company
P.O. Box 1245
Huntington, UT 84528

Date Received: 05/23/96
Date Reported: 06/19/96
Your Reference: P.O. #12265

Our Lab. Number	Your Sample Number	Description	δD^*	$\delta^{18}O^*$
HOR-90039	Birch Spring	Water	-129	-17.0
HOR-90040	Big Bear Spring	Water	-127	-16.7
HOR-90041	SBC-9 Source	Water	-130	-17.2 -17.1 **

** Duplicate preparations and analyses.

*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{\text{sample}} \text{‰} = \left[\frac{R_{\text{sample}}}{R_{\text{standard}}} - 1 \right] \times 1000$$

Where:

D/H standard is SMOW
 $^{18}O/^{16}O$ standard is SMOW

And:

D/H_{standard} = 0.000316**
 $^{18}O/^{16}O_{\text{standard}}$ = 0.0039948**

**Double atom ratio